



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 15, 2021 – 01:10 pm BST

PDB ID : 6Y86
Title : Active YidC insertase crystal structure with the first transmembrane domain resolved
Authors : Li, X.D.; Nass, K.
Deposited on : 2020-03-03
Resolution : 3.40 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.23.1
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.1

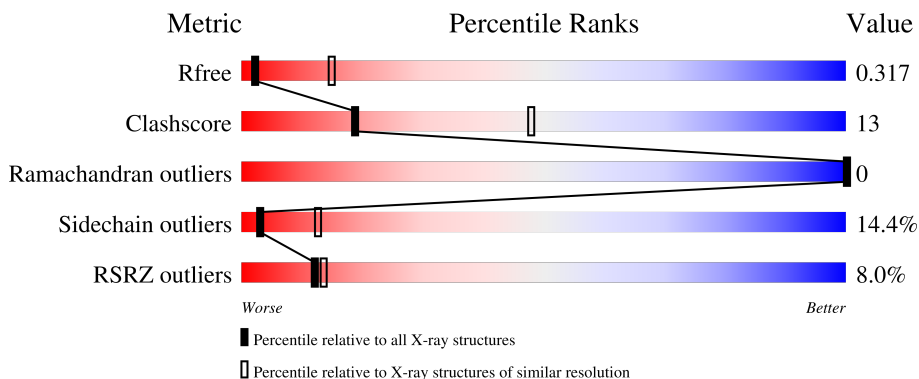
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.40 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1026 (3.48-3.32)
Clashscore	141614	1055 (3.48-3.32)
Ramachandran outliers	138981	1038 (3.48-3.32)
Sidechain outliers	138945	1038 (3.48-3.32)
RSRZ outliers	127900	2173 (3.50-3.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	425	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 3487 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Membrane protein insertase YidC.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	425	3487	2327	543	609	8	0	0	0

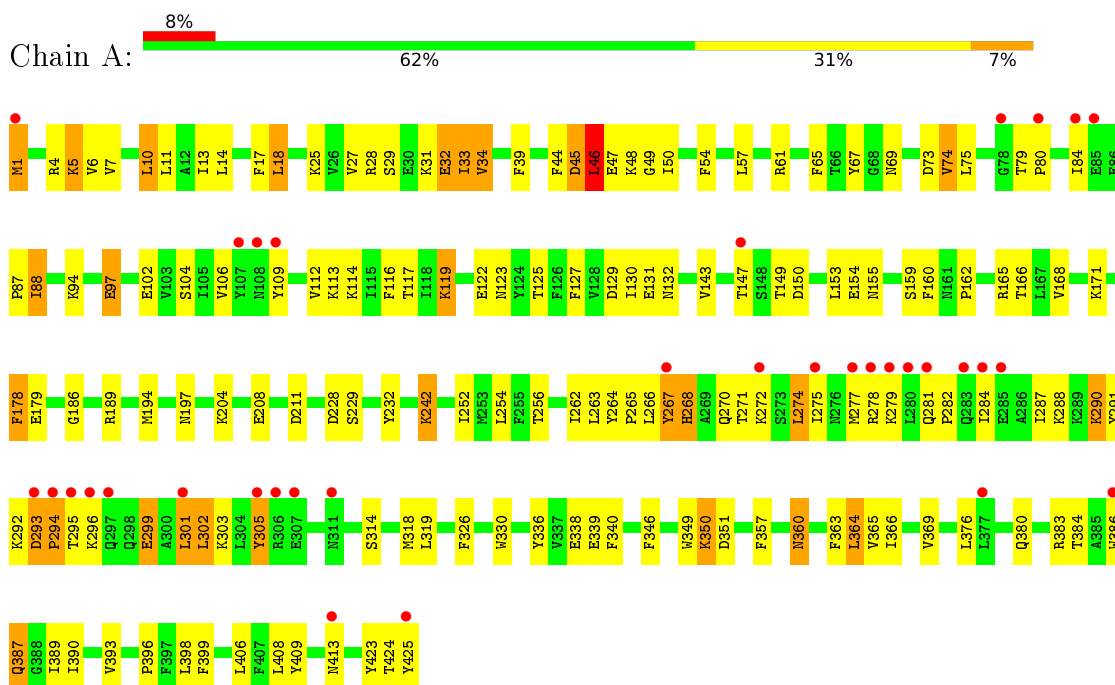
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	132	ASN	SER	conflict	UNP Q9X1H2

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Membrane protein insertase YidC



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	122.59Å 122.59Å 97.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.99 – 3.40 47.74 – 3.30	Depositor EDS
% Data completeness (in resolution range)	100.0 (19.99-3.40) 99.6 (47.74-3.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.15 (at 3.33Å)	Xtrriage
Refinement program	PHENIX dev_2645	Depositor
R, R_{free}	0.262 , 0.301 0.281 , 0.317	Depositor DCC
R_{free} test set	578 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	143.1	Xtrriage
Anisotropy	0.190	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 132.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.82	EDS
Total number of atoms	3487	wwPDB-VP
Average B, all atoms (Å ²)	156.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.33% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.29	0/3583	0.50	1/4871 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	46	LEU	CA-CB-CG	5.53	128.02	115.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	294	PRO	Peptide
1	A	295	THR	Peptide

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3487	0	3557	92	0
All	All	3487	0	3557	92	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 13.

All (92) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:271:THR:O	1:A:275:ILE:N	2.09	0.83
1:A:28:ARG:NH2	1:A:87:PRO:O	2.18	0.75
1:A:122:GLU:OE2	1:A:204:LYS:NZ	2.20	0.73
1:A:360:ASN:N	1:A:360:ASN:OD1	2.20	0.72
1:A:88:ILE:HG13	1:A:106:VAL:HB	1.71	0.72
1:A:336:TYR:HD1	1:A:339:GLU:HG3	1.58	0.69
1:A:266:LEU:O	1:A:270:GLN:N	2.20	0.67
1:A:278:ARG:O	1:A:380:GLN:NE2	2.28	0.67
1:A:112:VAL:HA	1:A:131:GLU:O	1.97	0.65
1:A:113:LYS:O	1:A:130:ILE:HA	1.96	0.65
1:A:54:PHE:HB3	1:A:65:PHE:HB3	1.79	0.63
1:A:84:ILE:HG12	1:A:109:TYR:O	1.99	0.62
1:A:46:LEU:HB2	1:A:87:PRO:HG3	1.82	0.61
1:A:171:LYS:NZ	1:A:208:GLU:OE1	2.34	0.60
1:A:49:GLY:O	1:A:114:LYS:NZ	2.29	0.59
1:A:252:ILE:O	1:A:256:THR:HG23	2.01	0.59
1:A:109:TYR:HD1	1:A:112:VAL:HG23	1.67	0.59
1:A:383:ARG:O	1:A:387:GLN:N	2.36	0.59
1:A:29:SER:HB3	1:A:32:GLU:HG2	1.85	0.59
1:A:25:LYS:HG2	1:A:97:GLU:HG3	1.85	0.59
1:A:256:THR:HG22	1:A:409:TYR:CD1	2.38	0.58
1:A:27:VAL:HB	1:A:34:VAL:HG12	1.85	0.58
1:A:46:LEU:HD23	1:A:47:GLU:HG2	1.85	0.57
1:A:364:LEU:HD11	1:A:396:PRO:HB2	1.86	0.57
1:A:168:VAL:HG22	1:A:194:MET:HG3	1.86	0.57
1:A:274:LEU:O	1:A:278:ARG:N	2.32	0.56
1:A:256:THR:HG22	1:A:409:TYR:HD1	1.70	0.56
1:A:67:TYR:CZ	1:A:69:ASN:HA	2.41	0.56
1:A:268:HIS:O	1:A:272:LYS:N	2.28	0.53
1:A:389:ILE:HD13	1:A:393:VAL:HG21	1.91	0.52
1:A:104:SER:HA	1:A:116:PHE:O	2.10	0.52
1:A:264:TYR:O	1:A:266:LEU:N	2.42	0.52
1:A:74:VAL:HG21	1:A:109:TYR:CE1	2.45	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:165:ARG:HH11	1:A:197:ASN:HD21	1.58	0.50
1:A:270:GLN:NE2	1:A:314:SER:O	2.41	0.50
1:A:299:GLU:O	1:A:299:GLU:HG3	2.12	0.50
1:A:267:TYR:O	1:A:271:THR:OG1	2.23	0.49
1:A:132:ASN:OD1	1:A:186:GLY:N	2.45	0.49
1:A:266:LEU:H	1:A:266:LEU:HD22	1.77	0.49
1:A:160:PHE:HE2	1:A:162:PRO:HA	1.77	0.49
1:A:279:LYS:O	1:A:284:ILE:HG13	2.13	0.48
1:A:293:ASP:OD1	1:A:294:PRO:HD3	2.13	0.48
1:A:281:GLN:HB3	1:A:282:PRO:HD2	1.96	0.48
1:A:290:LYS:HD3	1:A:291:TYR:H	1.79	0.48
1:A:129:ASP:OD1	1:A:189:ARG:NE	2.38	0.47
1:A:74:VAL:HG21	1:A:109:TYR:CZ	2.49	0.47
1:A:299:GLU:O	1:A:303:LYS:NZ	2.47	0.47
1:A:143:VAL:HG21	1:A:166:THR:HG22	1.97	0.47
1:A:154:GLU:HG3	1:A:155:ASN:H	1.80	0.47
1:A:178:PHE:HD2	1:A:179:GLU:N	2.12	0.47
1:A:271:THR:HA	1:A:274:LEU:HB3	1.97	0.46
1:A:364:LEU:HD13	1:A:364:LEU:HA	1.75	0.46
1:A:75:LEU:HA	1:A:80:PRO:HA	1.98	0.46
1:A:5:LYS:HE2	1:A:5:LYS:HB3	1.70	0.45
1:A:50:ILE:HG21	1:A:73:ASP:OD1	2.17	0.45
1:A:123:ASN:HB3	1:A:125:THR:HG23	1.99	0.45
1:A:33:ILE:HG23	1:A:44:PHE:HB2	1.99	0.45
1:A:346:PHE:HD2	1:A:349:TRP:CZ3	2.34	0.45
1:A:1:MET:SD	1:A:1:MET:N	2.82	0.45
1:A:363:PHE:CE1	1:A:408:LEU:HA	2.52	0.44
1:A:112:VAL:HG12	1:A:132:ASN:HB3	1.99	0.44
1:A:39:PHE:HA	1:A:57:LEU:HB2	1.98	0.44
1:A:242:LYS:O	1:A:242:LYS:NZ	2.44	0.44
1:A:398:LEU:HB3	1:A:399:PHE:HD1	1.83	0.44
1:A:102:GLU:HG3	1:A:119:LYS:HD2	2.00	0.43
1:A:278:ARG:HA	1:A:281:GLN:HG2	1.99	0.43
1:A:7:VAL:O	1:A:11:LEU:HB3	2.18	0.43
1:A:384:THR:HA	1:A:387:GLN:HB3	2.00	0.43
1:A:365:VAL:O	1:A:369:VAL:HG12	2.19	0.43
1:A:6:VAL:O	1:A:11:LEU:HB2	2.18	0.43
1:A:302:LEU:H	1:A:302:LEU:HD13	1.84	0.43
1:A:69:ASN:O	1:A:69:ASN:ND2	2.52	0.42
1:A:150:ASP:N	1:A:150:ASP:OD1	2.51	0.42
1:A:338:GLU:H	1:A:338:GLU:CD	2.22	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:262:ILE:HG13	1:A:263:LEU:HG	2.01	0.42
1:A:274:LEU:HA	1:A:277:MET:HB2	2.01	0.42
1:A:277:MET:C	1:A:281:GLN:HE21	2.23	0.42
1:A:340:PHE:HB3	1:A:351:ASP:OD1	2.19	0.42
1:A:31:LYS:HA	1:A:46:LEU:HD22	2.01	0.41
1:A:18:LEU:HD11	1:A:350:LYS:HE2	2.02	0.41
1:A:10:LEU:HD22	1:A:10:LEU:HA	1.81	0.41
1:A:149:THR:CG2	1:A:160:PHE:HB3	2.50	0.41
1:A:302:LEU:HA	1:A:305:TYR:CE2	2.56	0.41
1:A:301:LEU:H	1:A:301:LEU:HG	1.60	0.41
1:A:265:PRO:O	1:A:268:HIS:HB3	2.21	0.41
1:A:303:LYS:NZ	1:A:303:LYS:HB3	2.36	0.41
1:A:319:LEU:H	1:A:319:LEU:HG	1.68	0.41
1:A:117:THR:HB	1:A:127:PHE:HB2	2.03	0.41
1:A:45:ASP:OD2	1:A:48:LYS:N	2.54	0.41
1:A:228:ASP:O	1:A:232:TYR:HB2	2.21	0.41
1:A:159:SER:N	1:A:168:VAL:O	2.54	0.41
1:A:330:TRP:HA	1:A:406:LEU:HD21	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	423/425 (100%)	370 (88%)	53 (12%)	0	100 100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar

resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	382/382 (100%)	327 (86%)	55 (14%)	3 13

All (55) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	4	ARG
1	A	5	LYS
1	A	10	LEU
1	A	13	ILE
1	A	14	LEU
1	A	17	PHE
1	A	18	LEU
1	A	32	GLU
1	A	33	ILE
1	A	34	VAL
1	A	45	ASP
1	A	46	LEU
1	A	61	ARG
1	A	74	VAL
1	A	79	THR
1	A	88	ILE
1	A	94	LYS
1	A	97	GLU
1	A	119	LYS
1	A	147	THR
1	A	153	LEU
1	A	178	PHE
1	A	211	ASP
1	A	229	SER
1	A	242	LYS
1	A	254	LEU
1	A	267	TYR
1	A	268	HIS
1	A	274	LEU
1	A	287	ILE
1	A	288	LYS
1	A	290	LYS
1	A	292	LYS

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Mol	Chain	Res	Type
1	A	293	ASP
1	A	296	LYS
1	A	299	GLU
1	A	301	LEU
1	A	302	LEU
1	A	305	TYR
1	A	318	MET
1	A	326	PHE
1	A	350	LYS
1	A	357	PHE
1	A	360	ASN
1	A	364	LEU
1	A	366	ILE
1	A	376	LEU
1	A	386	TRP
1	A	387	GLN
1	A	390	ILE
1	A	413	ASN
1	A	423	TYR
1	A	424	THR
1	A	425	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	197	ASN
1	A	281	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	425/425 (100%)	0.41	34 (8%) 12 13	78, 138, 295, 400	0

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1	MET	7.3
1	A	294	PRO	7.1
1	A	307	GLU	6.5
1	A	295	THR	5.7
1	A	293	ASP	5.5
1	A	283	GLN	4.7
1	A	278	ARG	4.6
1	A	267	TYR	4.6
1	A	147	THR	4.5
1	A	386	TRP	4.2
1	A	297	GLN	3.7
1	A	306	ARG	3.7
1	A	296	LYS	3.7
1	A	80	PRO	3.5
1	A	107	TYR	3.2
1	A	275	ILE	2.9
1	A	305	TYR	2.9
1	A	413	ASN	2.8
1	A	109	TYR	2.8
1	A	84	ILE	2.8
1	A	284	ILE	2.7
1	A	281	GLN	2.7
1	A	280	LEU	2.7
1	A	311	ASN	2.7
1	A	377	LEU	2.4
1	A	78	GLY	2.4
1	A	425	TYR	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	301	LEU	2.2
1	A	285	GLU	2.2
1	A	108	ASN	2.2
1	A	277	MET	2.2
1	A	85	GLU	2.2
1	A	279	LYS	2.2
1	A	272	LYS	2.1

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.